Simple patterns, like adaptive greeting, randomness, maintaining context, or predictive follow-up, can make an already good Voice User Interface spectacular.

Patterns for Natural Language Applications
- beyond declaring Intents and Entities

Wolf Paulus
"Why don't you just tell me the name of the movie you have selected?"

works – because it's so hilariously implausible
“Hey Siri, what’s the best sushi place in town?”

“Talk to Siri as you would to a friend …”
“When I switched from Alexa to Amazon, to avoid a namespace collision with my daughter Alexis, the emotional feel of the device shifted from talking to a witty female computer, to interfacing with the Amazon corporate machine.”

Ben Galbraith - Senior Director at Google
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Random

Adaptive

Personal and personable

Context

Having a Conversation

Empathy
The speed makes a crucial difference. Compared with the trudge of chatting with Siri, speaking to Alexa feels natural, closer to speaking to a human than a machine.
Alexa, ask Mindy about the balance of my checking account.

Wolf, the balance of your …
Interaction Model

Intent Schema

```
{
  "intent": "GetAccountBalance",
  "slots": [
    {
      "name": "AccountTypeSlot",
      "type": "ACCOUNTTYPESLOT"
    },
    {
      "name": "BankNameSlot",
      "type": "BANKNAMESLOT"
    }
  ],
  "intent": ".. many more intents"
}
```

Sample Utterances

about my {AccountTypeSlot} account balance
about my {AccountTypeSlot} balance
about my {AccountTypeSlot} (BankNameSlot) account balance
about the balance of my {AccountTypeSlot} account
about the balance of my {AccountTypeSlot} (BankNameSlot) account
what is my {AccountTypeSlot} account balance
what is my (AccountTypeSlot) (BankNameSlot) account balance
what is the balance of my {AccountTypeSlot} account
what is the balance of my (AccountTypeSlot) (BankNameSlot) account

Custom Slot Types

- Account Types
- Bank Names

.. many more dictionaries
{   "intent": "getAccountBalance",   "slots": [     {"accountType": "checking"},     {"bankName": "null"}   ]}

“Alexa, talk to Mindy”

Session Started

OnLaunch (optional)

idea: pre-fetch data

“What bills are due today”

onIntent (..)

“How Hello Wolf, how can ..”

“Good news, there aren’t .. “

“Thanks”

Session Ended

“Talk to you soon, Wolf”
public interface IHandler {
    /** @return the name of the IntentHandler, e.g. to identify it in the JSON Interaction model. */
    String getName();

    /** @return Set of the utterances that will trigger this handler, to be inserted into the Interaction Model. */
    Set<String> getUtterances();

    /** @return Set of the slots that this intent handler evaluates, to be inserted into the json file. */
    Set<MSlot> getSlots();

    ...
}
public class Utils {
    /**
     * Randomly returns one of the strings from the provided String array.
     *
     * @param sa {@link String[]}
     * @return {@link String}
     */
    public static String random( final String[] sa ) {
        return sa[ new Random().nextInt( sa.length ) ];
    }
}
Adaptive
if (! isValid(user))  // Unknown User
    return random(Greeting.init_greeting);

if (last_login == null)  // Know User / 1st time here
    return random(Greeting.intro_greeting);

int hours = new Period(new DateTime(), last_login).getHours();

if (hours >= 24)  // 1st visit today
    return random(Greeting.greeting);
else  // returning user
    return random(Greeting.short_greeting);
1. Messages for a user that has not successfully provided credentials yet
   1. `<p><s>Hi, I am Mindy, your virtual financial assistant, helping you, to be good with your ...</s></p>`
   2. ...
   3. ...

2. Messages for an introduction, user successfully provided credentials, 1st meeting
   1. `<p><s>Hello %s, nice to finally meet you!</s><s>Now that I have access to the information you maintain in Mint, I can help ...</s></p>`
   2. ...

3. Messages for a standard greeting
   1. "Hello %s, what's your question?"
   2. "Hello %s, what do you want to know?"
   3. "Hi %s, welcome back, how can I help you today?"

4. Messages for a very short greeting
   1. "Welcome back, %s"
   2. "Hey, %s"
   3. "What's up?"
   4. ...
Hi there, welcome to Capital One.

You can ask me for things like your account balance, or make a credit card payment.

How can I help?
Hi there, welcome to Capital One.

You can ask me for things like your account balance, or make a credit card payment. How can I help?
public class RS {

    ...

    /** Messages for a very short greeting */

    static final String[] short_greeting = new String[] {
        "Welcome back %s",
        "Hey %s",
        "What's up %s?"
    };

}

/** Short personal greeting */

String result = String.format( Utils.random(RS.short_greeting), session.getUsername() );

idea: Keep logic out of Resource classes
“What is the balance of my checking account at Bank of America?”

Mindy: “The balance of your checking account at Bank of America is twenty-seven dollars.”

“What were the last three transactions?”
Just 470 calories
“What were the last three transactions”
“What is the balance of my **checking account** at BofA”

Intent: GetTransactions \((\text{number})\) \((\text{acct_type})\) \((\text{bank_name})\) \((\text{payee})\)
Have I been paid?
What were the last three transactions
What is the balance of my **checking account** at BofA

**Intent:** GetDeposit (acct_type) (bank_name) (payer)

**Intent:** GetTransactions (number)

**Intent:** GetAccountBalance (acct_type) (bank_name)
Mindy: "Are we still talking about your checking account at BofA?"

"Have I been paid?"

"What were the last three transactions"

"What is the balance of my checking account at BofA"

Intent: NoIntent

intent = stack.pop()
stack.clear()
“No”

Mindy: "Are we still talking about your checking account at BofA?"

“Have I been paid?”

“What were the last three transactions”

“What is the balance of my checking account at BofA"

Intent: GetDeposit ()
Shared Control / Having a Conversation
Volunteering information

User: **Alexa, talk to Mindy.**
Mindy: “Welcome back Wolf, your portfolio went up 2.7% today, good job!”

User: **What’s the balance of my IRA**

Every response object may also include a **re-prompt**, which is only played, if the user remains silent after the response text was played.

User: **How am I doing in my coffee budget.**
Mindy: “So far you spent $spent in the $budget category and have a total amount of $budgeted”

User: **<silence>**
Mindy: “$user, would you like to know about your $parent_budget as well?”
Empathy
I love you but hate your cold sister

- red is negative emotion
- blue is positive
- size indicates activation

Activation

Valence

love
cold
hate
sister

low
negative

high
positive

valence: 3.0
activation: 2.8364
imagery: 1.4
User: **Alexa, talk to Mindy.**
Mindy: “Hi Wolf, welcome back, how can I help you today?”

User: **What bills are due today?**
Mindy: “**Good news**, there aren’t any bills due today or tomorrow.”

User: **What’s my news brief.**
Mindy: “Over the last seven days, your investment in ALPHABET **grew** 4.5%. Your second **best performer** was SOUTHWEST, **growing** 4.46%. On the **other-side**, your investment in APPLE **lost** 0.38%”

User: **Thank you.**
Mindy: “**See you later** Wolf.”
Thanks for Coming

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